

***Remarks***

Reconsideration of this Application is respectfully requested.

Applicants respectfully request that this Amendment under 37 C.F.R. § 1.116 be entered by the Examiner, placing claims 1-17 in condition for allowance or materially reducing the number of issues for appeal. Applicants submit that the proposed amendments to claims 1, 9 and 16 do not raise new issues or necessitate the undertaking of any additional search of the art by the Examiner, since all of the elements and their relationships claimed were expressly or inherently recited by the claims as earlier examined.

Upon entry of the foregoing amendment, claims 1-17 are pending in the application, with claims 1, 9 and 14-16 being the independent claims. Claims 1, 9 and 16 are amended to clarify what Applicants claim as their invention. Support for the amendments to claims 1, 9 and 16 can be found throughout the application and, in particular, on page 2, lines 8-11. These changes are believed to introduce no new matter, and their entry is respectfully requested.

Based on the following remarks, Applicants respectfully request that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

***I. Rejections under 35 U.S.C. § 112 (claims 1-5, 7-9 11-13 and 16)***

Claims 1-5, 7-9, 11-13 and 16 have been rejected under 35 U.S.C. § 112, first paragraph. *See* Office Action, page 2, line 9, through page 3, line 22. Applicants respectfully traverse this rejection.

The Examiner is of the opinion that "neither the instant specification nor the prior art provides guidance for how to identify the desired genotypes." (Office Action, page 3, lines 11-13). Applicants respectfully disagree.

"Enablement is not precluded by the necessity for some experimentation such as routine screening." *In re Wands*, 858 F.2d 731, 736-37 (Fed. Cir. 1988) (citation omitted). The specification gives specific guidance on how to identify and select suitable genotypes through routine screening. The specification defines a standard for what constitutes suitable metal accumulation (*see, e.g.*, page 7, lines 3-7 and claim 1 of the specification). The specification teaches a specific screening method to identify suitable genotypes (*see, e.g.*, page 8, line 15, through page 9, line 12). The methods used in the screening process, i.e. those for collecting genotypes of *T. caerulescens*, finding areas of contaminated soil for screening, cultivating the plants and measuring levels of accumulated metals, are all well known to one of ordinary skill in the art. Following these teachings, one of ordinary skill in the art could collect genotypes of *T. caerulescens*, cultivate the genotypes in contaminated soil, measure the amount of accumulated metal and identify suitable genotypes. The specification gives sufficient guidance on how to identify and select suitable genotypes other than *T. caerulescens G15* without requiring unreasonable experimentation.

The Examiner is also of the opinion that "[o]ne skilled in the art would have to test an infinite number of *Thlaspi caerulescens* plants in order to identify and obtain a representative number of genotypes having the desired metal accumulating ability." (Office Action, page 3, lines 13-15). Applicants respectfully disagree.

Using the routine screening method of the present invention, Applicants discovered *T. caerulescens G15* from 13 different genotypes (*see, e.g.*, Figure 1 of the specification). It does not follow that an *infinite number* of genotypes would be needed to identify additional suitable genotypes, particularly when 1 out of 13 was found to be suitable. Moreover, "[t]he presence of

only one working example should never be the sole reason for rejecting claims as being broader than the enabling disclosure . . ." M.P.E.P. § 2164.02. The variability in metal uptake among genotypes does not show the screening method is unpredictable or irreproducible. Instead, the results show that the screening method works as designed and can be used to identify suitable genotypes. Applicants submit the rejection to claims 1-5, 7-9, 11-13 and 16 under 35 U.S.C. § 112, first paragraph is in error and request that it be withdrawn.

**II. Rejections under 35 U.S.C. § 102**

**A. First rejection (claims 1-4, 7-9, 11-13 and 16)**

**1. Brown *et al.* (Soil Sci. Soc. Am. J., 59:125-133 (1995)) (Brown I)**

Claims 1-4, 7-9, 11-13 and 16 have been rejected under 35 U.S.C. 102(b) as being anticipated by Brown, S. L., *et al.* (Soil Sci. Soc. Am. J., 59:125-133 (1995)) (Brown I). See Office Action, page 4, lines 1-22. Applicants respectfully traverse this rejection.

Brown I teaches phytoextraction of metals from solution (*see, e.g.*, Brown I, page 126, col. 1, lns. 28-32). In contrast to Brown I, claims 1, 9 and 16 of the present invention are drawn to a method of recovering cadmium and/or zinc from soil. Because Brown I does not teach the phytoextraction of cadmium and/or zinc from soil, Brown I does not anticipate claims 1, 9 and 16. And since claims 2-4, 7, 8, and 11-13 are dependent on claims 1, 9 and 16, Brown I does not anticipate claims 2-4, 7, 8, and 11-13. Applicants respectfully submit the rejection of claims 1-4, 7-9, 11-13 and 16 is in error and request that it be withdrawn.

The Examiner is of the opinion that "[w]hile the reference does not explicitly show removal of Cd and Zn from soils, Applicant's own specification (paragraph bridging pages 2 and

3) provides evidence that the teachings by the cited reference include a 2-year field study . . ."  
(Office Action, page 4, lines 17-20). Applicants respectfully disagree.

Brown I teaches phytoremediation from solution. However, regardless of whether the growth media is soil or solution, the *T. caerulescens* genotypes described in the paragraph bridging pages 2 and 3 of the specification accumulated a maximum of only 28 mg/kg of cadmium and only 4440 mg/kg of zinc (*see, e.g.*, page 3, lines 5-9 of the specification). In contrast, the present invention is drawn to *T. caerulescens* genotypes that accumulate about 1000-6000 mg/kg of cadmium and/or about 15,000-30,000 mg/kg of zinc. Because the genotypes described in the paragraph bridging pages 2 and 3 do not accumulate 1000-6000 mg/kg of cadmium and/or about 15,000-30,000 mg/kg of zinc, claims 1, 9 and 16 are not anticipated. And since claims 2-4, 7, 8, and 11-13 are dependent on claims 1, 9 and 16, these claims are also not anticipated. Applicants respectfully submit the rejection of claims 1-4, 7-9, 11-13 and 16 has been overcome and request that it be withdrawn.

**2. *Brown et al. (J. Environ. Qual, 23:1151-1157 (1994)) (Brown II)***

The Examiner is of the opinion that: "[i]n addition, the newly submitted reference (Brown et al J. Environ. Qual. 23:1151-1157, 1994), . . . teaches phytoremediation of Cd and Zn contaminated soils with *T. caerulescens* plant and the hyperaccumulating potential of said plants. . . . Therefore, all claim limitations are taught by the cited reference. (Office Action, page 5, lines 1-8). Applicants respectfully disagree.

Brown II teaches phytomining of potted soil. In contrast to Brown II, claim 1 is drawn to a method of recovering cadmium and/or zinc from *arable* soil. Arable soil is defined as soil or land fit for cultivation (*see* Exhibit A). Potted soil is not included in arable soil, because crops cannot be cultivated within the confines of a pot. Furthermore, growing a plant in potted soil

forces the plant to explore areas of the soil that it would otherwise avoid it was not confined to the limited area of the pot. Phytoremediation studies from potted soils, therefore, overestimate the ability of a plant to accumulate metals from arable soil.

In fact, in a field study disclosed in the specification, the plants used in Brown II (labeled *T. caerulescens* *G17* in the specification) were cultivated in arable soil, under identical conditions as other genotypes, including *T. caerulescens* *G15*. (see, e.g., page 8, line 15, through page 9, line 12). The results are shown in FIGS. 1-2 of the specification. As shown in FIG. 1, genotype *G17* accumulated fewer than 100 mg/kg cadmium from arable soil, while *G15* accumulated greater than 1500 mg/kg of cadmium in shoots from arable soil. Importantly, as shown in FIG. 2, genotype *G17* accumulated less than 1% cadmium in a cadmium to zinc ratio, while *G15* accumulated greater than 12%.

These results confirm that the genotype *G17* accumulates different levels of metals depending on whether it is grown in a pot or in arable soil. In other words, growing *G17* in potted soil, as disclosed in Brown II, is different and distinct from growing *G17* in arable soil as claimed in the present invention. Because Brown II teaches phytomining from confined potted soil, and claim 1 relates to phytomining arable soil, Brown II does not anticipate claims 1, 9 and 16. And since claims 2-4, 7, 8, and 11-13 are dependent on claims 1, 9 and 16, Brown II does not anticipate claims 2-4, 7, 8, and 11-13. Applicants respectfully submit the rejection of claims 1-4, 7-9, 11-13 and 16 has been overcome and request that it be withdrawn.

***B. Second rejection (claims 5 and 17)***

Claims 5 and 17 have been rejected under 35 U.S.C. 102(b) as being anticipated by Soriano et al. (U.S. Patent No. 4,326,884). See Office Action, page 5, line 10, through page 6, line 3. Applicants respectfully traverse this rejection.

In addition to the differences between the processes of Soriano and the present invention, the ore products taught by Soriano are distinct from the ore products of claims 5 and 17. Soriano teaches two ores, a calcined floatation zinc concentrate (*see, e.g.*, Soriano, col. 5, lns. 64-68) and a lead concentrate (*see, e.g.*, Soriano, col. 6, lns. 22-23). Claim 5 of the present invention is drawn to a zinc and/or cadmium-containing ore produced by incinerating biomass material. The material, other than zinc and/or cadmium, in the ores of Soriano is distinct from the material, other than zinc and/or cadmium, in the ores of the present invention. Furthermore, claim 17 is drawn to an ore comprising plant ash. Soriano does not teach an ore comprising plant ash. Because the ores in Soriano are distinct from the ores in the present invention, Soriano does not anticipate claims 5 or 17. Applicants respectfully submit the rejection to claims 5 and 17 is in error and request that it be withdrawn.

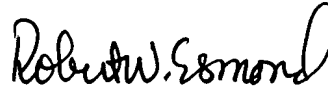
### ***Conclusion***

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicants believe that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided. Prompt entry and

favorable consideration of this Amendment and Reply, and allowance of all pending claims, are respectfully requested.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

A handwritten signature in black ink, reading "Robert W. Esmond". The signature is written in a cursive, flowing style.

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